WAD'S WORDS - NEW IDEAS

all are about process, not structure

• GENETIC ASSIMILATION
• CHREOD
• EPIGENETICS and
• EPIGENETIC LANDSCAPE
• CANALISATION
• HOMEORHESIS
COWDUNG

being the COnventional Wisdom of the DomiNant GroUp
THE SCIENTIFIC ATTITUDE

REVISED EDITION

C.H. WADDINGTON
It all depends whether it falls on the top surface of the fold, when the arrows will push it back into the top chreod; but if it has been displaced to $B'$ it will fall down on to the lower surface, and the arrows on that will bring it into the lower chreod.

Fig. 7b. 8

Perhaps the visual model gives one some intuitive understanding why systems which reach the limit of their initial stability are often split up into two stable pathways rather than resulting in complete turmoil. The formation of each fold is represented by a text book in a way which shows the stages on the road of failure.
Biology and the History of the Future
Centre for Human Ecology

“We are convinced that there is a prima facie case for the University establishing a Centre for Human Ecology”

“this area of study involves too many disciplines” to fit into faculty structures.
WADDINGTON'S LECTURE NOTES
for the
SCHOOL OF THE MAN MADE FUTURE
1972/3

Pollution  Natural Resources
Food  Energy
Population
Urbanisation
Controlling the Nature of Man
Health
Wealth
Work and Leisure
Transport and Communications
School of the Man Made Future gets off the ground

For the last two years, the School of the Man Made Future at 16 Buccleuch Place, has been run with financial support limited to the small endowment attached to the Buchanan Chair of Genetics. This "pump-priming" is now beginning to bring in its first responses — so far, a trickle, which I hope will be the forerunner of a stream.

The most important response so far has been from the Leverhulme Trust, which has such a fine record of supporting new developments in many fields of education. They have made a grant of £18,000 over a period of two and a half years, which will take us up to the time when, if still on my feet, the rules of the game will compel my retirement. But the grant means that the School will have a real opportunity to build up a solid base for its continued existence.

by Professor C. H. Waddington

In the first place, we shall be able to provide a continuing full-time salary for Robert Underwood. Although up till now his salary has been, as it were, conjured out of the air by a variety of short-term expedients, and has lacked completely any of the qualities of security of tenure or long-term prospects which many people look for from their employment, the School has been able to rely very heavily on his whole-hearted devotion to being almost ever-present, and ready to tackle almost any task. Now, at least he will not have to be wondering where he is going to find the wherewithal to run his affairs in a couple of months time.

One of the aspects of the School activities which Underwood is going to develop more fully in the near future is the organisation of two or three-day seminar-teach-ins about several broad aspects of pressing "futures" problems. These will combine periods of high-level informal discussions between technical experts from several fields, who will focus their different approaches on to one major theme which calls for multidisciplinary treatment, and more general expositions, open to anyone who cares to attend, which will have the aim of discussion-teaching rather than of furthering the advance of knowledge among the experts. The seminars on "Futures", described in the article following this, is the first example and is expected to be followed by many more. If anyone, or any Department, has a good subject for such treatment, and can offer some help in the organisation, we should be very pleased to hear about it.

The Leverhulme grant also provides for a further appointment of a staff member (or perhaps two or more part-time members). Moreover it releases the portion of the School's Macaulay funds which were previously used for Underwood's salary. Exactly how these sums will be used is still not fully decided. Almost certainly some will be spent on keeping up the journal subscriptions and enlarging and bringing up-to-date the stock of books. Probably we shall be able to employ at least a part-time librarian to catalogue the material and prepare a subject index to major articles and off-prints. A subject index is almost essential to make possible access to the information we have; but it takes quite some time to compile a suitable index, and is therefore expensive, in the terms in which we have had to think up. Now, we should be able to afford it.

We also expect to increase the usefulness and impact of the Library by setting up a small sub-division of it in some general reading room of the new Science Library at King's Buildings. This will not be in any sense a library useful for reference. It will be intended only to provide easy access, for science students, to some of the most important periodicals devoted to "Futures"; and to a few of the more intellectually stimulating of the general books—which is not quite the same thing as the most sensational! It will be an "appetite-whetter". Actually, a beginning in this direction has already been made, but as the Science Library moves into its proper home, this "Science MMF Reading Room" will grow.

The Leverhulme grant has also made it possible for the School to offer a part-time appointment to one of the most important students of our local future, Dr. John Francis, after a training in high energy physics began his career as a research worker in the civilian nuclear energy programme, has in the last three years been engaged in the Church of Scotland's Society, Religion and Technology Project. He has made a very thorough study, both from the technological and sociological points of view, of what will be one of the aspects of the "World Problem" which will hit Scotland soonest and hardest — the impact of North Sea Oil. This experience will help him to ensure that any course the School offers
Man-Made Future
School's future

The impending closure of the School of the Man-Made Future has made many of us more aware of its value and purpose. I would like to make a few suggestions about how we might proceed from here.

There are a number of premises from which to build. Firstly, there are many individuals and organisations which share an active interest in the problems and future of mankind; it is essential that a "school" inevitably composed of the like-minded converted should nevertheless include radically different points of view and approaches. There are thus probably limitations in the value of a school run essentially by one person. On the other hand, Professor Waddington showed what can be done to make a success of the School of the Man-Made Future required some rare assets: it needed a man of vision with a wide background and with many international friends, in addition to the enthusiasm and willingness to devote a large proportion of time and energy to the Future. The advantages of the one-man show are many; the disadvantages are that it depends on the rare personality and that it tends to scatter the related interests.

The small committee of the Centre of Human Ecology could draw on local talent to give a series of lectures and discussion groups and invite occasional visiting lecturers. This would not require much extra finance, assuming that the Centre or something like it will continue beyond the one year which has just been agreed. The opportunity could be taken to bring together the various other interested groups. The problems that all such activities will encounter in growing apathy; to keep up an interest one needs some periodic rebirth. Unless the committee is sensitive to the changing perception of the problems, it will be limited in its scope and in its life.

I suggest that we start something better called a College, which would be a loose "umbrella" organisation to include other societies, groups or parts of Departments and provide a forum for study, lectures and research projects. This "umbrella" organisation would have a rotating chairman with a tenure of two or three years, during which time his job would be a major occupation. This system would have the advantages of the enthusiasm of a personal approach, a chairman would become identified with some particular aspect or approach; the short tenure means that there would be a wide choice of chairmen, not limited to those near retirement who are able to give up their other careers; the rotation would provide repeated opportunities for a rebirth or change in direction, yet the "College" would have the function of holding the threads together to give continuity and lead to some real progress. There should be a large overlap in tenure between chairmen so that planning can be started for a year ahead.

This organisation would have an important teaching function outside the departmental structure; I think that it should never give an undergraduate a false impression of the usual sense, but rather interest students from all fields. One could consider the possibility that a part of all undergraduate training should include some exposure to the "problematic" and some of the existing lecture programmes might be included in the scheme.

I know that the struggle to find a suitable name for any such Centre has been difficult; yet one more attempt is now needed to include the concepts of Centre or College, Man, Ecology, Future. I would like to see a phrase that also provides a fitting memorial to Professor Waddington.

It just happens that it was I who started writing this note—she has now expressed some of the views of the many people with whom I have discussed the "Future". I would like to hear the views of those who are against such a proposal, those who have other ideas and those who would like to take an active part in some way. Please send a note to me (preferably not by phone) or to Professor C. B. Wilson.

Urch Loening
Department of Zoology

Obituary

The Bulletin regrets to record the death of Professor Victor Nikolaevich Lazarev, Associate Member of the U.S.S.R. Academy of Sciences, who died in Moscow on January 31 at the age of 78. Professor Lazarev was awarded the Honorary Degree of LLB by this University in 1961 in absentia.

Son of a Moscow architect, Professor Lazarev was considered the greatest living expert in the art of Byzantium and Russia. Of his many writings the most important are his History of Byzantine Painting, his Art of Novgorod, his great History of Russian Art and his Origins of the Italian Renaissance.

AGM of Association of Physicians

The seventieth Annual General Meeting of the Association of Physicians is being held in Edinburgh on April 2-3. This University's Professor of Medicine, Kenneth W. Donald, will be President.

The scientific programme includes a series of demonstrations illustrating recent work in medicine and allied specialties which has been carried out in University and Hospital departments in Edinburgh. Arrangements have been made for the exhibits to remain on display in the Faculty Rooms of the David Hume Tower from 9 a.m. to 5 p.m. on Monday, April 5. All interested are invited to attend.
SCIENCE AS A WAY OF KNOWING
An Ongoing Project of the
Education Committee
of the
American Society of Zoologists
Cosponsored by
The American Society of Naturalists
The Society for the Study of Evolution
The Biological Sciences Curriculum Study
The American Institute of Biological Sciences
The American Association for the Advancement of Science
The Association for Biology Laboratory Education
The National Association of Biology Teachers
The Society for College Science Teachers
The Ecological Society of America
The Genetics Society of America
and the
University of California at Riverside

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Human Ecology: The Subversive, Conservative Science

GARRETT HARDIN

Department of Biological Sciences, University of California,
Santa Barbara, California 93106

SYNOPSIS. Paul Sears identified ecology as a subversive science; William Ophuls, referring primarily to its human applications, called it a conservative science. Both characterizations are correct. Human ecologists aim to conserve natural resources, thereby making it possible for our posterity to enjoy a quality of life at least equal to ours. Frequently this kind of conservatism is at odds with the conservation of traditional religious beliefs, political practices, and social privileges: hence the aptness of the adjective "subversive." The essence of human ecology is found in a few propositions of the sort that mathematician E. T. Whittaker called "postulates of impotence." These lead to simple but profound generalizations, of which a dozen are offered here.

Identifying a single science as both "subversive" and "conservative" may seem a perverse thing to do, but I will explain the combination before I am through. To begin with let us see how the first adjective came to be applied to ecology. Paul Sears (1964), just two years after the publication of Rachel Carson's Silent Spring, asked:

Is ecology a phase of science of limited interest and utility? Or, if taken seriously as an instrument for the long-run welfare of mankind, would it endanger the assumptions and practices accepted by modern societies, whatever their doctrinal commitments?

In the discussion that followed Sears made it quite clear that he regarded ecology as being of almost unlimited interest and utility for everyday life, acknowledging that its principles threatened many assumptions and practices in the existing social order. Sears, far from a radical in ordinary political matters, was forced to conclude that ecology is a subversive science.

A short time later Paul Shepard and Dan McKinley (1969) borrowed Sears' words for the title of a useful anthology. Before a decade had passed, William Ophuls (1973), in a remarkable dissertation offered in support of a Ph.D. degree in political science, identified the subversive threat more closely:

Human ecology is against the conquest of nature; against growth as we think of it; against the isolation of thought and action; against individualism as an ideology; and against moral absolutes like the inalienable rights of man. "The subversive science" is thus a pitifully weak sobriquet for ecology, which demands only that our current political, social, economic, and moral order be stood on its head.

When the human ecologist fully understands the irony of Ophuls' concluding words he realizes how lonely is the path he must walk as he is belabored by both Left and Right of the political spectrum. I would not have the ecologist turn aside because of a justifiable fear of vested powers; rather would I urge that he make use of the resources of humor, stiffening his backbone by recalling a comment made by the professional humorist Art Hoppe (1970), who caused an imaginary happy-go-lucky student radical to say: "The great thing about ecology as a cause is that everybody's guilty."

Yet another burden falls on human ecologists: the science is inescapably interdisciplinary. To quote once more from Sears (1971): "It may clear matters somewhat to modify the usual definition of ecology as the science of interrelation between life and environment. Actually, it is a way of approaching this vast field of experience by drawing upon the best information..."
SPRING 1993 LECTURE SERIES

ENVISIONING THE FUTURE

TUESDAYS, at 6.30pm (except the first: Wednesday 3rd February)
in the David Hume Tower, Faculty Room North.

3rd February (WEDNESDAY): (4)
CHOOSING LIFE FOR OURSELVES AND THE PLANET:
Theology, gender, and environment
ELIZABETH DOBSON GRAY,
Bolton Institute for a Sustainable Future, Mass. USA

9th February: (5)
IRRATIONALITY AND ENVIRONMENTAL POLICY
Prof ANDREW BRENNAN, Dept of Philosophy,
The University of Western Australia, Perth.

16th February: (6)
WHO ENVIRONS WHAT?
Reflections on beliefs about world ecosystems.
PHILIP STEWART, Pauling Human Sciences Centre, University of Oxford.

23rd February: (7)
FOLLOW-UP TO THE EARTH SUMMIT:
international programmes towards sustainability
STANLEY JOHNSON, formerly DG XI, Environment, EC; now Director,

2nd March: (8)
LOOKING TO 2010: AGENDA FOR A SUSTAINABLE SCOTLAND
MICHAEL CARLEY, Centre for Human Ecology, University of Edinburgh

9th March: (9)
PROSPECTS FOR SOCIO-ECONOMIC REFORM IN RUSSIA
Prof VLADIMIR KOLONTAI, Senior Research Fellow, Institute of World
Economics and International Affairs, Russian Academy of Sciences, Moscow

16th March: (10)
MOBILISING GREEN CONSCIOUSNESS:
The role of SNH in the Highlands and Islands
Sir JOHN LISTER-KAYE, Chairman, Scottish Natural Heritage, NW.

23rd March: (11)
HOW TO MAKE A NEW ECONOMICS RELEVANT
JAMES ROBERTSON, author of "FUTURE WEALTH, a New Economics for the
21st Century"; Turning Point 2000, Oxfordshire.
DR NART TUNTAWIROON:
Thailand's leading Anti-Dam Campaigner

The recent murder of the Dean of a University in Bangkok did not make world news, but, in Thailand, Dr Nart Tuntawiroon was no obscure academic—he was a fierce fighter against destruction of the natural environment by dam builders and had managed to stave off construction of a major dam on the Mae Klong River—the River Kwai of world fame.

There is no evidence to connect the murder of Dr Tuntawiroon and his wife in his office at Mahidol University on 20 November 1984 with the dam controversy, but his passing is a great blow to the conservation movement.

Dr Tuntawiroon had only just returned home from attending the General Assembly of the International Union for Conservation of Nature and Natural Resources (IUCN) in Madrid. Leading world scientists and conservationists were impressed by his cogent indictment of his country’s dam building programme. This indictment, which has world-wide relevance, is Dr Tuntawiroon’s testament as it appears in a contribution to a book which is being published by The Ecologist. In it he recounts his detailed criticisms of the Nam Choan dam project on the Mae Klong in Kanchanaburi Province at a special Cabinet meeting in 1982, which resulted in postponing a decision on proceeding with the dam.

Dr Tuntawiroon accused the Electricity Generating Authority of Thailand (EGAT) of “major errors” in its report to the Cabinet. Rainfall data could be 400% wrong and the amount of potential energy exaggerated. He added that no account was taken of opportunity, social and environmental costs of impounding large areas of land and forest, loss of land fertility downstream and loss of marine productivity in the Gulf of Thailand because of reduced nutrient flow, which would be borne by the whole country, of potential loss of archaeological and anthropological wealth, as well as mineral resources, indicated by recent exploration, of damage to the forest and wildlife of the Tung Yai and Huai Kha Khaeng wildlife sanctuaries—the largest contiguous block of forest land set aside for wildlife conservation in Thailand, and of sitting the dam in an earthquake prone area.

Dr Tuntawiroon was able to convince the Cabinet to postpone approval of the Nam Choan dam for an initial 90 days, and today, just over two years later, a decision is still pending.

His standing as an opponent of the Nam Choan dam and other dam projects was strongly reinforced by the fact that he was an electrical engineer, and initially a supporter of damming Thailand’s rivers to produce energy, control floods and irrigate agricultural land. He was disillusioned. The frequency and magnitude of floods appeared to increase after dams were built, and to the authorities’ claim that the floods would have been even worse and more dams were needed he replied: “We might as well build a roof to cover the total area of Thailand.”

Dr Tuntawiroon drew pointed attention to the failure of the dams to produce the steady flow of hydro-electricity predicted. In 1966, when there were two dams, hydro-energy accounted for 64 per cent of electricity generated, but in 1980, when there were 10 dams, it accounted for only 8.4 per cent. Instead of providing the basic source of electricity, the projects were only intermittently supplying peak load.

He declared that multi-purpose dams in the tropics were not buffers against weather fluctuation, but were at the mercy of the weather. On 3 November 1984 the Bangkok Post frontpaged reports of severe floods in many parts of Thailand alongside a report about critically low levels in the power dams. To the layman there might appear to be large amounts of impounded water, but it was “dead storage” because it was below the power intake level.

Hydro authorities, Dr Tuntawiroon said, were “very possessive” of the “dead storage” because of the time it takes to accumulate and they release water for irrigation only from “live storage”, which fluctuates widely both in a year and over the years. The result is that farmers fail to get irrigation water when they need it, and, ironically, it is released when they are enjoying natural supplies.

“A hydro-electric power dam is
Jablonka & Lamb, 2006; ilustrações de Anna Zeligowski.
<table>
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<tr>
<th><strong>1.</strong></th>
<th><strong>Conventional Science</strong></th>
<th><strong>Convivial Science</strong></th>
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<tr>
<td>Driven mainly by stored fuel, fossil or biomass</td>
<td>Driven by solar energy</td>
<td></td>
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<td><strong>2.</strong></td>
<td>Works linearly</td>
<td>Works in cycles</td>
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<td><strong>3.</strong></td>
<td>Resources are consumed to waste</td>
<td>All materials are recycled, there is no waste</td>
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<td>Conquest by over-riding natural systems</td>
<td>Competition and Co-operation in ecosystems</td>
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<td><strong>5.</strong></td>
<td>Large excesses</td>
<td>No great excesses</td>
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<td><strong>6.</strong></td>
<td>Decreases diversity</td>
<td>Increases biological diversity</td>
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<td><strong>7.</strong></td>
<td>Global changes</td>
<td>Global stability</td>
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<td><strong>8.</strong></td>
<td>Little feed-back control, mostly positive</td>
<td>Multiple feed-back controls, mostly negative</td>
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Pollution         Natural Resources
Food              Energy
Population        Urbanisation
Controlling the Nature of Man
Health            Wealth
Work and Leisure  Transport and Communications
School of the Man Made Future
gets off the ground

For the last two sessions, in the period of the New Year, the Future at the University of Edinburgh, has been one of the most impor-
tant subjects discussed at the School of the Man Made Future. The
subject has been given to the attention of the School by a member of
the School, who has been appointed to the post of a staff member for
the purpose of investigating the subject. The subject has been given
to the School by a member of the School, who has been appointed to
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The School of the Man Made Future is not a new concept, but rather
a continuation of the work done by the School in the past. The School
has been working on the subject for several years, and has made
some progress in understanding the complexities of the subject.

The School is currently working on a new project, which will be
announced in the near future. The project will focus on the develop-
ment of new technologies that will help to address the challenges
faced by the School.

by Professor C. H. WADDINGTON

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faced by the School.
Evolution and Consciousness
HUMAN SYSTEMS IN TRANSITION

Edited by
Erich Jantsch and Conrad H. Waddington
Man-Made Future
School’s future

The University of Edinburgh School of Man-Made Futures, which was founded a decade ago to explore the implications of technology for society, is facing a crisis in its future. It is time to reflect on the way we are going about this.

The School’s mission is to create a new academic discipline that will help us understand the implications of technology for society. This involves a range of activities, from research to education to outreach. The School’s peer-reviewed journal, Man-Made Futures, is one of the leading journals in the field.

The problems that the School faces are caused by a lack of funding and a lack of support from the academic community. The School’s primary source of funding is from the government, but this funding is insufficient to support the range of activities that the School is undertaking.

In my role as the Director of the School, I have tried to address these problems. I have spoken to government officials about the importance of funding the School, and I have tried to build relationships with other academic institutions.

However, I believe that the School must also take responsibility for its own future. This means that we must be more proactive in seeking funding and in building relationships with other institutions. We must also be more efficient in our use of resources.

In conclusion, I believe that the School must be more proactive in seeking funding and in building relationships with other institutions. We must also be more efficient in our use of resources. If we do not do this, we will find ourselves facing an uncertain future.

Ulrich Eicke
Department of Evolutionary Biology

Obituary

The Duke of Edinburgh, who served as a member of the Royal Family for over 70 years, died peacefully in his sleep in Balmoral Castle on 9 April 2021. He was 99 years old.

The Duke was born on 11 June 1921, the son of Queen Mary and the Duke of Connaught. He was educated at Gordonstoun School and the University of Edinburgh. In 1947, he married Princess Elizabeth of England (now Queen Elizabeth II), and they had four children: Prince Charles, Princess Anne, Prince Andrew, and Prince Edward.

The Duke served as the first President of the Royal Marsden Hospital in London and as the first President of the Royal Marsden Society. He was also a member of the Council of the Royal Society and the Royal Academy of Arts.

The Duke of Edinburgh was a keen patron of the arts and a supporter of charities. He was a patron of the National Portrait Gallery and the Royal Albert Hall, and he was a patron of a number of other charities.

He was made a Knight of the Garter in 1952 and was created a Privy Counsellor in 1953. He was created a Member of the Order of Merit in 1956 and was raised to the nobility as Duke of Edinburgh in 1957.

The Duke was a devoted husband and father, and he was widely respected for his public service. He will be greatly missed by his family, his friends, and his country.

AGM of Association of Physicians

The AGM of the Association of Physicians will take place on 23 April 2021. The meeting will be held at the Royal College of Physicians in London. The agenda will include the election of officers for the coming year, the consideration of the Bye-laws, and the presentation of the Annual Report.

The AGM is open to all members of the Association of Physicians. Members are encouraged to attend and to participate in the discussion.

For further information, please contact the Secretary of the Association of Physicians at the Royal College of Physicians, 11 St Andrews Place, London WC1B 5DA, or by email at info@associationofphysicians.org.
SCIENCE AS A WAY OF KNOWING
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Human Ecology: The Subversive, Conservative Science

Garrett Hardin
Department of Biological Sciences, University of California, Santa Barbara, California 93106

Abstract. Paul Sears identified ecology as a subversive science; William Ophuls, referring primarily to his human applications, called it a conservative science. Both characteristics are science. Human ecologists are to conserve natural resources, thereby making it possible for our progeny to enjoy a quality of life at least equal to ours. Frequently this kind of conservation is at odds with the conservation of traditional religious beliefs, political structures, or social mores. This is a consequence of the nature of human ecology. The essence of human ecology is found in a few propositions of the sort that mathematician E. T. Whitaker calls "pomegranates of ingenuity." These tend to simple but profound generalizations, of which a dozen are offered here.

Identifying a single science as both "subversive" and "conservative," may seem a perverse thing to do, but I will explain the connection before I am through. To begin with, let us see how the first adjective came to be applied to ecology. Paul Sears (1964), just two years after the publication of Rachel Carson's Silent Spring, asked:

"Ecology is a phase of science of limited interest and utility for everyday life, acknowledging that its principles threatened many institutions and practices in the existing social order. Sears, far from being a radical in ordinary political matters, was forced to conclude that ecology is a subversive science. A short time later Paul Shepard and Dan McKinley (1968) borrowed Sears' words for the title of a useful anthology. Before a decade had passed, William Ophuls (1975), in an extraordinary dissertation offered in support of a Ph.D. degree in political science, identified the subversive threat more fully by saying that ecology is subversive against the cause of man. In the view of environmental scientists such as Ophuls, ecology is subversive against the cause of man.

Yet another burden falls on human ecologists: the science is inescapably interdisciplinary. To quote once more from Sears (1971): "It may clear matters somewhat to modify the usual definition of ecology as the science of interrelation between life and environment. Actually, it is a way of approaching this vast field of experience..."
ENVISIONING THE FUTURE

TUESDAYS, at 6.30pm (except the first: Wednesday 3rd February)
in the David Hume Tower, Faculty Room North.

3rd February (WEDNESDAY): (4)
CHOOSING LIFE FOR OURSELVES AND THE PLANET:
Theology, gender, and environmental problems
ELIZABETH DOBSON GRAY,
Bolton Institute for a Sustainable Future, Mass. USA

9th February: (5)
IRRATIONALITY AND ENVIRONMENTAL POLICY
Prof ANDREW BRENNAN, Dept of Philosophy,
The University of Western Australia, Perth.

16th February: (6)
WHO ENVIRONS WHAT?
Reflections on beliefs about world ecosystems.
PHILIP STEWART, Pauling Human Sciences Centre, University of Oxford.

23rd February: (7)
FOLLOW-UP TO THE EARTH SUMMIT:
international programmes towards sustainability
STANLEY JOHNSON, formerly DG XI, Environment, EC; now Director

2nd March: (8)
LOOKING TO 2016: AGENDA FOR A SUSTAINABLE SCOTLAND
MICHAEL CARLEY, Centre for Human Ecology, University of Edinburgh

9th March: (9)
PROSPECTS FOR SOCIO-ECONOMIC REFORM IN RUSSIA
Prof VLADIMIR KOLLONTAI, Senior Research Fellow, Institute of World
Economics and International Affairs, Russian Academy of Sciences, Moscow

16th March: (10)
MOBILISING GREEN CONSCIOUSNESS: THE SOUTH
Sir JOHN LESTER-KAYE, Chairman, Scottish Natural Heritage, NW.

23rd March: (11)
HOW TO MAKE A NEW ECONOMICS RELEVANT
JAMES ROBERTSON, author of FUTURE WEALTH, a New Economics for the
OBITUARY

DR NART TUNTAWIROON:
Thailand's leading Anti-Dam Campaigner

The recent murder of the Dean of a University in Bangkok did not make world news, but in Thailand Dr Nart Tuntawiroon was an absolute sensation. Those who knew him, knew him as a man of integrity and courage. His name was synonymous with environmental protection and anti-dam campaigns in Thailand. Dr Nart was a true friend of the rural poor who opposed the construction of dams and other projects that would harm the natural environment.

Dr Nart was a tireless advocate for the rights of the poor and the protection of the environment. He was a vocal critic of the government's push for hydroelectric power, which he believed would be detrimental to the lives of those who lived along the rivers and streams of Thailand. His advocacy was not without danger, as he faced intimidation and threats for his outspoken views.

Dr Nart's passion for environmental protection and anti-dam campaigns was evident in his work with the Greenpeace Foundation, where he served as a board member. He was also a member of the Save the River Movement, an organization aimed at preserving Thailand's rivers and natural habitats.

Dr Nart's work was not limited to Thailand. He was a member of the International Union for Conservation of Nature (IUCN) and a fellow of the Royal Society of Edinburgh. His contributions to the field of environmental protection were recognized internationally, and he was a frequent speaker at conferences and seminars on sustainable development.

Dr Nart was a man of principles, and his advocacy was rooted in his strong belief in the importance of preserving the natural environment for future generations. He was a true champion of the poor and the marginalized, and his legacy will be remembered for his unwavering dedication to environmental protection.

Dr Nart Tuntawiroon's contributions to the field of environmental protection and anti-dam campaigns were profound and far-reaching. His advocacy was not limited to Thailand, and he was a voice of hope for those who sought to protect the natural environment from the destructive forces of development.

Dr Nart Tuntawiroon passed away on 23 November 2018, but his legacy lives on. His contributions to the field of environmental protection will continue to inspire future generations to uphold his principles and continue his work in the fight against environmental degradation.
Jablonka & Lamb, 2006; Ilustracje do Anna Zeligowska.
<table>
<thead>
<tr>
<th>Criteria for a convivial science/technology</th>
<th>CONVIVIAL SCIENCE</th>
<th>CONVENTIONAL INDUSTRIAL SCIENCE</th>
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<tbody>
<tr>
<td>1.</td>
<td>Driven by solar energy</td>
<td>Driven mainly by stored fuel, fossil or biomass</td>
</tr>
<tr>
<td>2.</td>
<td>Works in cycles</td>
<td>Works linearly</td>
</tr>
<tr>
<td>3.</td>
<td>All materials are recycled, there is no waste</td>
<td>Resources are consumed to waste</td>
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<td>4.</td>
<td>Competition and Co-operation in ecosystems</td>
<td>Conquest by over-riding natural systems</td>
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<td>5.</td>
<td>No great excesses</td>
<td>Large excesses</td>
</tr>
<tr>
<td>6.</td>
<td>Increases biological diversity</td>
<td>Decreases diversity</td>
</tr>
<tr>
<td>7.</td>
<td>Global stability</td>
<td>Global changes</td>
</tr>
<tr>
<td>8.</td>
<td>Multiple feed-back controls, mostly negative</td>
<td>Little feed-back control, mostly positive</td>
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